CEVE 304: Structural Analysis

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Course Objectives:

To provide students with a clear understanding of the basic theories of structural analysis which arm them to analyze typical structures and elements; to provide a basis for advanced analysis methods and structural modeling; to enhance analytical skills of next generation structural engineers.

Scope:

This course introduces students to the basic techniques required by practicing engineers for analyzing the majority of common structures and structural elements, including trusses, beams, frames, arches, and cables. The course begins with a basic review of statics, proceeds through analysis of determinate structures, and ends with analysis of indeterminate structures.

Prerequisites:

CEVE/MECH 211 (statics)

Required Textbook:

Hibbler, R. C. (2012). *Structural Analysis*, 9th ed. Prentice Hall. ISBN-13: 978-0131976412.

Course Organization:

- **Meeting Time/Location:** TR 6:40-7:55 PM; Ryon Lab 201
- **TA:** TBD
- **Office Hours:** By appointment
- Assigned work will include weekly reading in the reference books and homework problems. You are encouraged to work in groups; however, you must hand in your own assignment. Homework must be submitted written neatly and legibly in pencil on *engineering paper*.
- Late assignments will be marked down 50%. Assignments will not be accepted more than 24 hours late. You can drop your lowest homework assignment grade.
- There will be three tests throughout the term. The tests will be closed book with one single-sided 8 ½ by 11 sheet of handwritten notes.

Grading:

Homework	17.5%
Test 1	27.5%
Test 2	27.5%
Text 3	27.5%

Tentative Exam Schedule (NOTE: Subject to change. Dates are approximate.):

Test 1:	2/06/18
Test 2:	3/20/18
Test 3:	4/19/18

Course Content:

- **Introduction**
  Overview; design-analyze relationship; analysis for sustainability; types of structures and elements; loads — Ch. 1

- **Statics, Determinacy, and Stability**
  Free-body diagrams; determinacy of structures; stability; idealization of structures — Ch. 2

- **Analysis of Trusses**
  Types of trusses; method of sections; method of joints — Ch. 3

- **Analysis of Beams and Frames**
  Shear and moment diagrams; superposition; deflected shapes — Ch. 4

Approximate Date for Test 1: 2/06/18

- **Cables and Arches**
  Types of cables and arches; point and distributed loads — Ch. 5

- **Influence Lines (ILs)**
  Muller-Breslau Principle; qualitative and quantitative ILs for determinate structures; qualitative for indeterminate — Ch. 6 & 10.10

- **Deflections**
  Double integration; conjugate beam; moment area; virtual work — Ch. 8 & 9

Approximate Date for Test 2: 3/20/18

- **Flexibility Method (Force Method) for Indeterminate Structures**
  Force method of analysis; beams; frames; trusses — Ch. 10

- **Slope-Deflection Method (Displacement Method) for Indeterminate Structures**
  Slope-deflection analysis; beams; frames — Ch. 11

- **Approximate Methods of Analysis**
  Gravity loads on frames; lateral load on frames; portal method; cantilever method — Ch. 7

Date for Test 3: 4/19/18

Academic honor code:
The Honor System embodies the concept of personal honor in a framework of law and practice. To quote the Constitution, Rice students are placed on their honor by the group "not to violate the trust placed in them in any way." The result is a system of conducting examinations, writing papers, and performing other academic endeavors with regard for individual honor and without faculty proctoring. Thus, the responsibility for maintaining the validity of academic work is placed on all students. Website: http://www.ruf.rice.edu/~honor/

Disabilities:
Any student with a documented disability needing academic adjustments or accommodations is requested to speak with me during the first two weeks of class. All discussions will remain confidential. Students with disabilities will need to also contact Disability Support Services in the Ley Student Center.